

In the Drawings

In response to the objections to the drawings (Section 2), Applicants submit herewith Annotated drawings showing the amendments to Figs. 5, 6 and 8, and Replacement Drawings showing Figs. 5, 6 and 8 as amended. Applicants have replaced all occurrences of the term “Sample” with the term “Symbol” in these drawings to be consistent with the specification. No new matter has been added by these changes.

In view of the foregoing, Applicants respectfully request that the changes to Figs. 5, 6 and 8 be accepted and entered, and that the objection to Fig. 5 be withdrawn.

REMARKS

In response to the Office Action mailed September 14, 2005, Applicants respectfully request reconsideration.

By this amendment, Applicants amend claims 1, 6, 9, 10, 11, 17 and 20-25, solely for clarification. As a result, claims 1-6, 9-17 and 20-27 are pending for examination, of which claims 1, 6 and 17 are independent.

1. The Objections to the Specification are Overcome

The disclosure is objected to because: the text on page 2, lines 23-30 is purportedly unclear; the text on page 3, lines 1-5 is purportedly unclear; and the text on page 6, lines 5-8 is purportedly unclear. Applicants respectfully traverse these objections.

In response to the objections to the text on page 2, lines 23-30, and the objections to the drawings, Applicants have amended Figs. 5, 6 and 8 to alleviate any confusion between use of the term "Sample" and "Symbol." Further, as the amendments to the drawings should further clarify, the dotted lines in Fig. 4 are not representative of the precise point at which a sampling takes place, but rather indicate the boundaries in the time domain between samplings of incoming symbols and outgoing symbols.

With respect to the text on page 3, lines 1-5 (which is related to the text on page 2, lines 23-30), the Office Action states (Section 1, second full paragraph), that the "Examiner believes that f2 shown in Fig. 3 represents not the outgoing but the incoming symbol, and the outgoing symbol, shown as f1, will not effect the nearby symbols." In response, Applicants have amended page 2, lines 25-26 to make clear that the sub-carrier f1 corresponds to an incoming symbol and the sub-carrier f2 corresponds to an outgoing symbol.

As shown in Fig. 3 and described on page 2, lines 11-18, Fig. 3 shows, in the *frequency domain* (see horizontal axis), the spectrum of a single sub-carrier f1 conveyed in a symbol. "This spectrum is not a discrete value at f1 because the symbol is sampled in a window" (Page 2, lines 11-12), which results in the frequency spectrum of f1 having the sinc function shown in Fig. 3. "To avoid the interference of the lobes of this spectrum with nearby channels, the sub-carriers are chosen to be 'orthogonal' [to one another]. This means, as shown, that the distance

between sub-carriers is chosen so that each sub-carrier is at a zero crossing of the sinc functions.” (Page 2, lines 13-16).

Fig. 4 illustrates symbols being transmitted and received in the *time domain*. “For clarity reasons, it is supposed that the incoming symbols convey only one sub-carrier f_1 and the outgoing symbols convey only one sub-carrier f_2 , the sub-carriers f_1 and f_2 being adjacent.” (Page 2, lines 24-26 as amended by this Amendment). In other words, for illustrative purposes, it is supposed that incoming symbols $S'1$ and $S'2$ are composed of only one sub-carrier f_1 , and outgoing symbols $S1$ and $S2$ are composed of only a single sub-carrier f_2 .

As is clearly illustrated in Fig. 4, during the sampling of incoming signal $S'1$, a transition occurs between outgoing symbols $S1$ and $S2$. Accordingly, during the sampling of symbol $S'1$, the *echo* of the transition between the outgoing symbols $S1$ and $S2$ is also sampled. (See page 2, line 26 – page 3, line 2). “Such transitions are discontinuities which have a wide spectrum in the frequency domain. This is shown in figure 3 by dotted lines for sub-carrier f_2 . This wide spectrum effects all the nearby channels.” (Page 3, lines 2-6). Thus, Fig. 3 illustrates that, at the time of the transition between $S1$ and $S2$ in the echo of the outgoing symbol, the discontinuity of the transition causes a wide spectrum, which is illustrated by the dotted lines of sub-carrier f_2 in Fig. 3. The wide spectrum of the discontinuity interferes with the sampling of the symbol $S'1$ on sub-carrier f_1 , which is adjacent to subcarrier f_2 .

In view of the foregoing, the text on page 2, lines 23-30 and the text on page 3, lines 1-5 is clear. Accordingly, Applicants respectfully request that the objections to this text be withdrawn.

With respect to the text on page 6, lines 5-8, Applicants have amended page 6, line 17 to make clear that the orthogonality is between the sub-carriers of the received symbols $S'n$ and sub-carriers of echoes of the outgoing symbols. Further, as explained from page 6, line 5 – page 8, line 27, with reference to Figs. 6 and 7, the subtraction removes echo portion $h(X_{n+1})$, which is replaced by a portion of same length, $h^*(X_n)$ of the beginning of the echo of symbol S_n . (page 6, lines 6-23).

By removing the echo portion and replacing it with a portion from the beginning of the echo symbol S_n , the transition between $h(S_n)$ and $h(X_{n+1})$ of symbol IN illustrated in Fig. 6 is

removed. Removing the transition removes the discontinuity that has the wide spectrum that would otherwise cause interference with nearby sub-carriers of an incoming signal, as described in Applicants' specification with respect to sub-carriers f1 and f2 in relation to Figs. 3 and 4, and as further explained above.

In view of the foregoing, the text on page 6, lines 5-18 is clear. Accordingly, Applicants respectfully request that the objections to this text be withdrawn.

2. Claims 1, 6 and 17 as Amended Satisfy the Requirements of §112, First Paragraph

Claim 1 stands rejected under 35 USC §112, first paragraph, as purportedly failing to comply with the enablement requirement. Specifically, the Office Action contends that "a processing circuit for making a local echo orthogonal is not described in the specification to enable one skilled in the art to which it pertains, because the disclosure seems incomplete, omitting essential parts [sic] showing that the achieved echo is orthogonal." Applicants respectfully traverse this rejection.

Although Applicants disagree that claim 1 prior to this Amendment did not satisfy the enablement requirement of §112, first paragraph, Applicants have amended claim 1 as shown above to recite *inter alia*, "a processing circuit for making sub-carriers of a local echo of the outgoing time domain symbols orthogonal to sub-carriers of the incoming time domain symbols." As discussed above, the sub-carriers (e.g., f1) of the incoming time domain symbols can be made orthogonal to the sub-carriers (e.g., f2) of a local echo of outgoing time domain symbols by removing the transition that causes the discontinuity having the wide spectrum, for example, using the means recited in claim 1. This is clearly supported and enabled throughout the specification, in particular, with reference to Figs. 3, 4, 6 and 7, and the descriptions thereof, including page 6, lines 14-18, as amended by this Amendment.

In view of the foregoing, Applicants respectfully submit that claim 1 satisfies the requirements of §112, first paragraph, and request that the rejection of claim 1 under this paragraph be withdrawn. Claims 2-5 each depend from claim 1 and are patentable for at least the same reasons. Accordingly, Applicants respectfully request that the rejections of these claims under §112, first paragraph, be withdrawn.

Claims 6 and 17 stand rejected under 35 USC §112, first paragraph, because the limitation “making the echoed first outgoing symbol and the echoed outgoing signal orthogonal to the first outgoing symbol and the second outgoing symbol” is allegedly not described in specification to enable one skilled in the art to which it pertains. Applicants respectfully traverse this rejection.

Although Applicants do not agree that claims 6 and 17 prior to this Amendment fail to meet the enablement requirement under §112, first paragraph, Applicants have amended each of claims 6 and 17 to recite *inter alia*, “making sub-carriers of the echo signal orthogonal to sub-carriers of the at least one incoming symbol” and “a circuit to make sub-carriers of the echo signal orthogonal to sub-carriers of the at least one incoming symbol,” respectively. For reasons that should be clear from the discussion set forth above with respect to claim 1, these limitations are supported and enabled throughout the specification, including in Figs. 3, 4, 6 and 7 and the descriptions thereof, including page 6, lines 14-18, as amended by this Amendment.

In view of the foregoing, claims 6 and 17 satisfy the requirements of §112, first paragraph. Accordingly, Applicants respectfully request that the rejections of these claims under this paragraph be withdrawn. Claims 9-16 and 20-27 depend from claims 6 and 17, respectively, and are patentable for at least the same reasons. Accordingly, Applicants respectfully request that the rejections of these claims under §112, first paragraph, be withdrawn.

3. Claims 1-6, 9-17 and 20-27 Satisfy the Requirements of §112, second paragraph.

Claim 1 stands rejected under 35 USC §112, second paragraph, as purportedly being indefinite because the limitation “a processing circuit for making a local echo orthogonal” is unclear. Applicants respectfully traverse this rejection.

Although Applicants do not agree that claim 1 prior to this Amendment is not clear under §112, second paragraph, Applicants have amended claim 1 as shown above solely for clarification to recite, *inter alia*, “a processing circuit for making sub-carriers of a local echo of the outgoing time domain symbols orthogonal to sub-carriers of the incoming time domain symbols.” This amendment makes clear what is meant by the term “orthogonal” in claim 1, and for which further clarification is provided in the specification and in Applicants’ discussion in Section 1 above.

In view of the foregoing, claim 1 as amended satisfies the requirements of 35USC §112, second paragraph, and Applicants respectfully request that the rejection of claim 1 under this paragraph be withdrawn. Claims 2-5 each depend from claim 1 and are patentable for at least the same reasons. Accordingly, Applicants respectfully request that the rejections of these claims under §112, second paragraph, be withdrawn.

Claims 6 and 17 stand rejected under §112, second paragraph as purportedly being indefinite because “a first/second outgoing symbol” and a “echoed first/second outgoing symbol” are unclear because “outgoing symbol” is used for both transmit and receive directions making the claim confusing. Applicants respectfully traverse this rejection.

Although Applicants do not believe that claims 6 and 17 were not clear under §112, second paragraph, prior to this Amendment, Applicants have amended each claim by replacing occurrences of “echoed first outgoing symbol” and “echoed second outgoing signal” with “echo of the first outgoing symbol” and “echo of the second outgoing symbol,” and have added references to “at least one incoming symbol.” These amendments remove any confusion regarding the use of the term “outgoing signal” with respect to transmission and reception, and are clearly supported throughout the specification.

In view of the foregoing, claims 6 and 17 as amended satisfy the requirements of §112, second paragraph. Accordingly, Applicants respectfully request that the rejections of claims 6 and 17 under this paragraph be withdrawn. Further, claims 9-16 and 20-27 depend from claims 6 and 17, respectively, and are patentable for at least the same reasons. Accordingly, Applicants respectfully request that the rejection of these claims under §112, second paragraph be withdrawn.

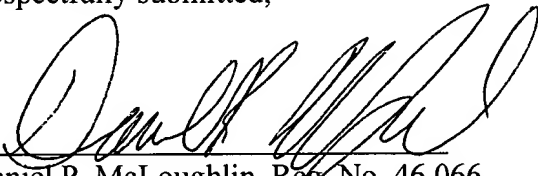
CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

By:



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Docket No.: S1022.80316US00
Date: March 14, 2006

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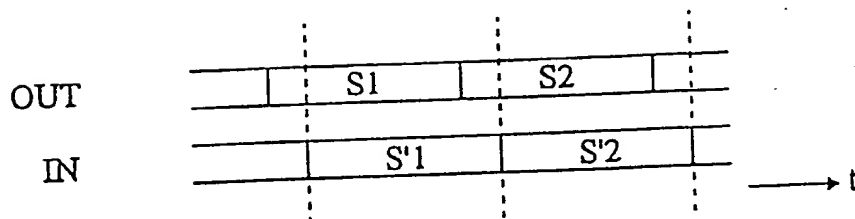


Fig 4

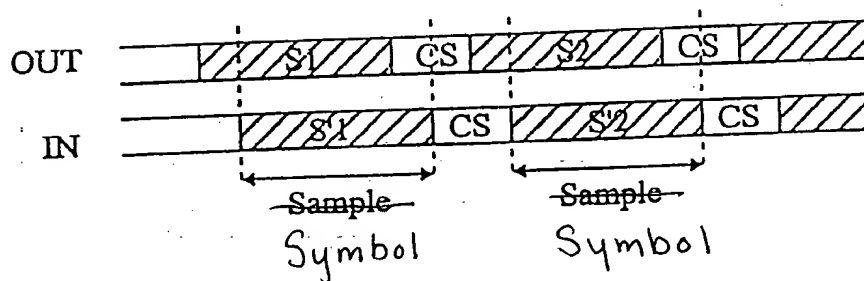


Fig 5

Prior Art

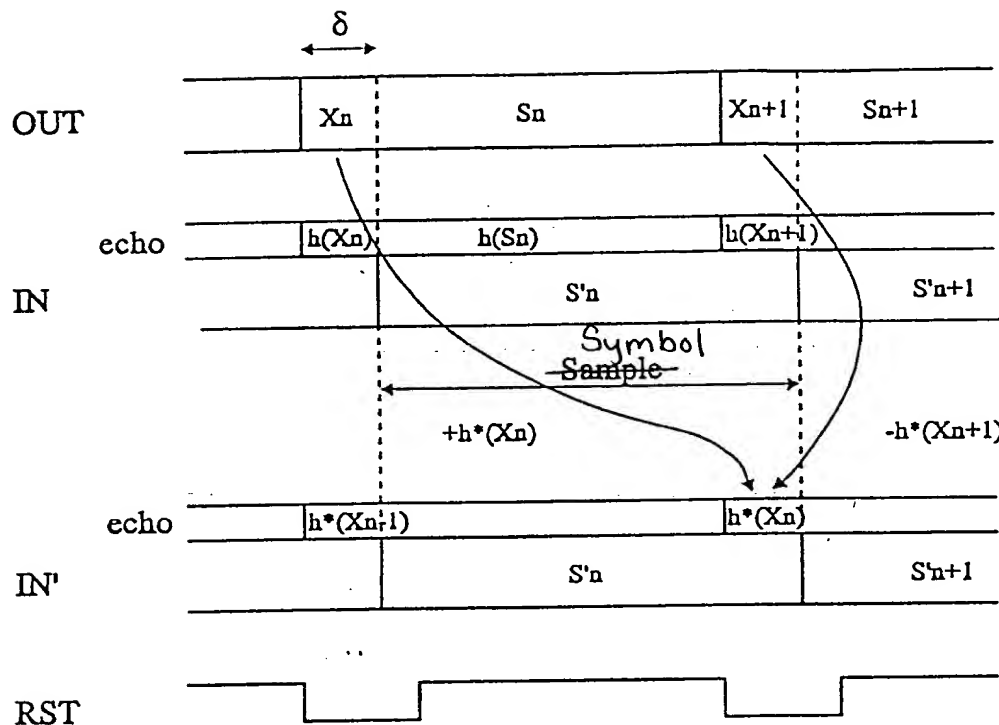


Fig 6

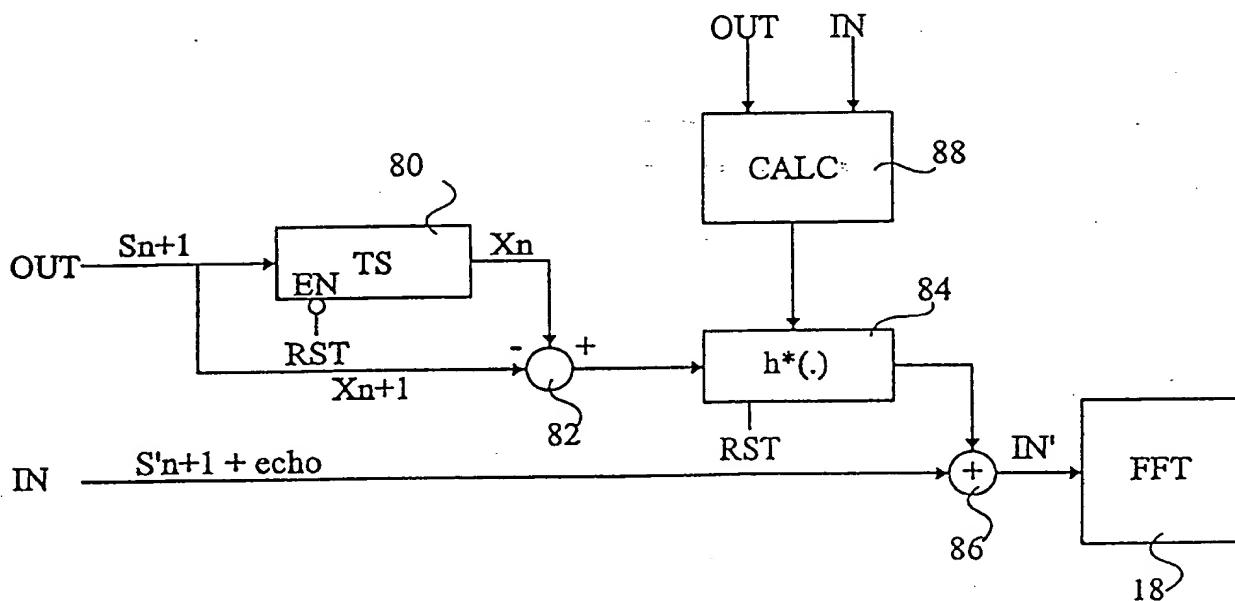


Fig 7



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Title: DSL TRANSMISSION SYSTEM WITH MEANS FOR
ENSURING LOCAL ECHO ORTHOGONALITY
Inventor: Isso et al.
Serial No.: 09/517,417
Docket No.: S1022.80316US00
Sheet 4 of 4
ANNOTATED SHEET SHOWING CHANGES

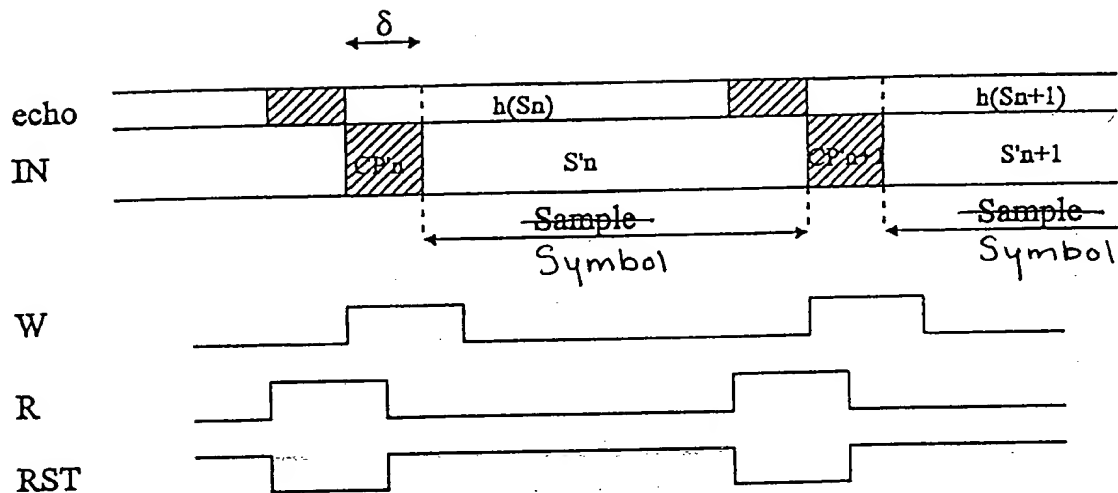


Fig 8